

REMARKS

Claims 16-22 are active in the present application.

The rejection of Claims 16-22 under 35 U.S.C. §102(b) over Hilbert et al is respectfully traversed.

For the Examiner's convenience, Applicants remind the Examiner that the present invention provides, in part, a process for producing a polyester resin which comprises polycondensing a dicarboxylic acid component containing terephthalic acid or its ester-forming derivative as the main component and a diol component containing ethylene glycol as the main component in the presence of (1) a compound of at least one member selected from the group consisting of titanium group elements in Group 4A of the Periodic Table, via an esterification reaction or an ester exchange reaction, wherein the above compound (1) is added to an esterification reaction tank for a final stage in a multi-stage reaction apparatus or to an esterification reaction or ester exchange reaction product in a stage for transportation to a melt polycondensation step (see Claim 16). Applicants note that Hilbert et al neither discloses, nor suggests the claimed method and, as such, cannot effect the patentability of the same.

First, Applicants again direct the Examiner's attention to the fact that in one aspect of the claimed process the titanium group element (compound (1)) is added at the *final stage* of esterification, which is a limitation that Hilbert et al fail to disclose or suggest. As clearly set forth in MPEP §2131, the standard for determining anticipation requires that the reference "must teach every element of the claim." Therefore, Hilbert et al cannot anticipate the claimed invention since this reference fails to disclose each and every element of Claim 16 (and, as such, dependent Claims 17-22).

Despite the foregoing, the Examiner maintained the rejection over Hilbert et al, in the outstanding Office Action. The Examiner appears to base this rejection on his interpretation of Example 4 of Hilbert et al as disclosing a titanium-containing compound at a stage for transportation to a melt polycondensation step. It appears that the Examiner's position is based on the assertion that the titanium-containing compound is contacted with an esterification reaction product (PET) prior to melt condensation. However, this assertion by the Examiner is incorrect.

In particular, we note that the Examiner has apparently overlooked the fact that in Example 4 of Hilbert et al the titanium-containing compound is added to the polycondensation tank (see column 17, lines 58-60) and not "the esterification reaction tank for a final stage in a multi-stage reaction apparatus or to an esterification reaction or ester exchange reaction product in a stage for transportation to a melt polycondensation step" as presently claimed. In view of the fact that Hilbert et al fail to disclose or suggest all the limitations of the claims, this reference simply cannot anticipate the claimed invention.

Nonetheless, the Examiner attempts to compensate for this deficiency in the disclosure of Hilbert et al stating: "for example, in a continuous process, the reaction product from the esterification is transported to the polycondensation step. The preparatory step in between clearly satisfy the requirements of the claims." This assertion is unfounded as the process disclosed in Example 4 of Hilbert et al is *not* a continuous process. Therefore, this allegation by the Examiner is without relevance and can not provide support for the anticipation rejection.

The Examiner is reminded that the inquiry for anticipation is whether each and every limitation of the claim is disclosed by the cited prior art. Therefore, in this case, the relevance of Hilbert et al must be limited to that which it actually discloses or suggests (i.e.,

addition of the titanium-containing compound to a polycondensation tank) and not that which is suggested *solely* by the *claimed invention*. To do so would not only be contrary to well-established precedent, but would also only give rise to a question of obviousness *not* anticipation.

To this end, the addition of the acetyltriisopropyl titanate in Hilbert et al may be best understood in view of the following explanation.

At page 26, line 13 to page 28, line 26 of the present specification, Applicants specifically detail the various stages of the esterification reaction. In particular, reference is made to page 27, lines 1-21, which defines the various stages of the esterification reaction, including the final stage during which the titanium group element (compound (1)) is added. As found in present Claim 16, in the presently claimed invention compound (1) is added to an esterification reaction tank for a final stage in a multi-stage reaction apparatus or to an esterification reaction or ester exchange reaction product in a stage for transportation to a melt polycondensation step.

In contrast, in Example 1 of Hilbert et al the esterification step is followed to *completion* including the final stage in which the temperature is ramped from 250°C to 265°C at a pressure of 25 psig; however, no titanium group element (compound (1)) is added during this stage. Therefore, Hilbert et al fails to read on addition of the titanium group element (compound (1)) at the claimed final stage of the multi-stage reaction apparatus.

Turning to the alternative claimed titanium group element (compound (1)) addition point, the Examiner points to Example 4 (column 17) of Hilbert et al and asserts “a titanium compound is added to a TPA based PET oligomer followed by heating and polycondensation.” However, Claim 16 of the present application defines ‘Compound (1) (Group 4A of the Periodic Table) is added *to an esterification tank* for a final stage in multi-

stage reaction apparatus or to an esterification reaction or ester exchange reaction product *in a stage for transportation to a melt polycondensation step.*" (Claims 17 to 22 are all dependent on Claim 16) As stated above, this assertion by the Examiner apparently overlooks the fact that in Example 4 of Hilbert et al the titanium-containing compound is added to the polycondensation tank (see column 17, lines 58-60).

The addition time difference between Hilbert et al and the present invention may be summarized in the following table:

Item	Example 4 of <u>Hilbert et al</u>	Claim 16 of the Present Application
Addition point	Polycondensation tank	Esterification tank or stage for transportation

As stated in the previous response, the phrase "stage for transportation" in Claim 16 means that, for example, a catalyst is added to the esterification product which is present in a transportation pipe connected to a melt polycondensation tank, as exemplified at page 50, line 17 to page 51, line 15 (Example 9). Hilbert et al fail to disclose or suggest this addition point.

In view of the foregoing, Hilbert et al cannot anticipate the claimed invention since this reference fails to disclose each and every element of Claim 16 (and, as such, dependent Claims 17-22).

As stated above, the Examiner's assertions appear to be more akin to an obviousness rejection, rather than an anticipation rejection. However, the Examiner is reminded that, MPEP §2142 states: "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation... to modify the reference... Second, there must be a reasonable expectation of success. Finally, the prior art reference...

must teach or suggest all the claim limitations.” In the present application, at no point do Hilbert et al disclose or suggest adding a titanium group element (compound (1)) to an esterification reaction tank for a final stage in a multi-stage reaction apparatus or to an esterification reaction or ester exchange reaction product in a stage for transportation to a melt polycondensation step, much less the advantages obtained thereby and exemplified in the Examples of the present application.

To this end, the Examiner’s attention is directed to the Declaration under 37 C.F.R. §1.132 (“the 132 Declaration”) **submitted herewith**. In the 132 Declaration, the present inventors provide data demonstrate the advantageous properties that flow from aforementioned differences in the disclosure of Hilbert et al and the presently claimed invention. Specifically, the 132 Declaration demonstrates the differences between Hilbert et al, as represented by Example 4, in which the titanium-containing compound is added *to the polycondensation reaction tank* and not “the esterification reaction tank for a final stage in a multi-stage reaction apparatus or to an esterification reaction or ester exchange reaction product in a stage for transportation to a melt polycondensation step” as presently claimed.

In paragraph 5 of the 132 Declaration, Applicants report the production methods that correspond to Example 4 of the present application and Example 4 of Hilbert et al. With respect to the example of Hilbert et al, Applicants note that a explicit reproduction of the method described therein was not possible due to deficiencies in the description thereof. Therefore, as seen in section “B” of paragraph 5, melt polymerization and solid phase polymerization were performed in the same manner as described above for Example 4 of the present specification (*i.e.*, addition of the Ti catalyst to the polymerization tank). However, the amounts of catalyst added were changed to be consistent with those used in Example 4 of Hilbert et al.

In paragraph 6 of the 132 Declaration, the differences between the addition method represented by Example 4 of Hilbert et al (designated as Example 1-4-5) and the addition method defined in pending Claim 16 is shown in the modified version of Table 1 (designated as Table B) taken from the printed patent of the parent application (U.S. 6,667,383).

Specifically, this table compares the Hilbert et al method with that set forth in Examples 4 and 10 in U.S. 6,667,383 (i.e., the present specification). For the Examiner's convenience, this table is reproduced below:

			Catalyst was added to the polycondensation reaction tank	Cited reference	Present application
			US 6,667,383 Example 4	US 5,886,133 Example 1-4-5	US 6,667,383 Example 10
Addition point of Compound(1)			polycondensation tank		Stage for transportation
Contents of metal atoms	Titanium atoms(T)	(mol/t)	0.063	0.104	0.063
	Magnesium atoms(M)	(mol/t)	0.123	-	0.123
	Phosphorus atoms(P)	(mol/t)	0.194	0.194	0.194
	M/T		1.95	0	2.0
MSP	IV	(dl/g)	0.55	0.58	0.56
	Melt polycondensation time	(hrs)	no description <u>3.78</u>	<u>3.45</u>	3.33
	Polycondensation rate(V1)	(dl/g/hr)	no description <u>0.146</u>	<u>0.168</u>	0.168
Resin chips	Intrinsic Viscosity[η]	(dl/g)	0.74	0.71	0.75
	Solid phase polycondensation time	(hrs)	no description <u>205°C 25:00</u>	222-3°C 4:38 <u>205°C 28:00</u>	205°C 20:00
	Polycondensation Rate(V2)	(dl/g/hr)	no description <u>0.008</u>	<u>0.0061</u>	0.010
	V2/V1		no description <u>0.055</u>	<u>0.036</u>	0.060
	Color coordinate b		+2.4	no description	+2.4
	Acetaldehyde Content(AA1)	(ppm)	no description	no description	4
	Cyclic trimer(CT)	(ppm)	0.29	no description	0.28
	Absorbance	395nm	0.14	no description	0.14
		500nm	0.02	no description	0.02

Stepped Molded plate	Temperature-rising crystallization temperature(Tc)	(°C)	172	no description	no description
	Acetaldehyde content (AA2)	(ppm)	no description	no description	18
	Haze	(%)	no description	no description	8
Bottle	Aroma-retention Property		○	no description	○
	Mold contamination Property		○	no description	○
	Acetaldehyde odor		no description	no description	4

In the Analysis section of paragraph 6 of the 132 Declaration, Applicants offer, in part, the following explanation:

At first, when the Ti catalyst was added to the “stage for transportation” in accordance with the method of present Claim 16 (Example 10 of US 6,667,383), the solid phase polycondensation was improved by about 25% (polycondensation rate (V2): 0.008 → 0.010) as compared with the case where using the completely same catalyst composition, the Ti catalyst was added to the polycondensation tank (Example 4 of US 6,667,383). This means that the productivity was improved by about 25% and substantially significant difference was brought about in an industrial application.

It is also evident from the aforementioned results that when the method of the present invention is compared with the method (Example 1-4-5) of US 5,886,133 (Hilbert et al.), although the Ti catalyst amount of the present invention is small (titanium atoms (T): 0.104 → 0.063), the solid phase polycondensability was further improved in the present (polycondensation rate (V2): 0.0061 → 0.010) (improved by at least 50%). And, as the results, the balance V2/V1 of the solid phase polycondensation rate and the melt polymerization rate was substantially improved.

Such relationship between the point of adding the catalyst and the effect of improving the polymerizability is described in column 11, lines 16 to 24 of US 6,667,383 issued on the parent application. The results above are neither disclosed, suggested, nor expected from the disclosure of Hilbert et al.

In view of the foregoing, Applicants submit that Hilbert et al fail to even support a *prima facie* case of obviousness as this reference fails to disclose or suggest all the claim limitations and fails to provide any reasonable expectation of success.

In view of the foregoing, Applicants request withdrawal of this ground of rejection.

Applicants submit that the present application is now in condition for allowance.

Early notification of such action is earnestly solicited.

Respectfully submitted,

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